

TECHNOLOGY TRANSFER IN TRANSPORT PLANNING: A CHALLENGE AND NECESSITY FOR AFRICAN CITIES

by

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ABSTRACT

Gaborone currently suffers transport – related problems including road congestions, increasing road accident rate, air pollution and inadequate public transport. These problems have been greatly exacerbated by Botswana's economic growth. They are increasingly the subjects of concern of road transport planning authorities.

Developing as well as developed countries face similar transport and related problems. Their policies in these areas are similar in some respects but differ markedly in others, however to create a living city and region, on a human scale, accessible to all and providing a good quality of life for its citizens is a common vision. Trips are necessary and require to be catered for. This does not equate to predict and provide. Predict and provide is not sustainable where provision is by road and private car only. It is sustainable to provide for growth in demand for travel on public transport as well.

This paper addresses the importance and ways of technology transfer in transport planning, emphasising the need for integrated transport and land use policies and strategy implementation through the development plan and development control process.

Key words: Transport planning, land use policies, integrated transport, sustainable development, and technology transfer

1. INTRODUCTION

Transport services and infrastructure have long been regarded as key ingredients to the rate and geographic pattern of economic growth. As such, transport investments were made to provide essential services and to achieve public policy and political objectives. Transport plays a crucial role in the economic life of the community and is essential if what is now regarded as an acceptable standard of living is to be maintained.

Although transport's potential to meet effectively the travel demand needs to be improved continuously, it became evident that such effectiveness has its price. A number of transport technologies implied high – energy consumption and required substantial capital inputs in production and operation. As a result, several transport modes became expensive to users. This caused equity problem because charges required to cover

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operating costs were not affordable by all population groups, thus limiting their mobility and welfare.

What is required apparently is an integrated transport policy, which can be interpreted as greater investment in public transport and the subsidisation of more environmentally friendly modes of transit. Society needs to have as its goal a “sustainable transport system” with focus on mass public transit and the use of safe walking and cycling for short journeys.

There is an urgent need to learn from the experience of others, to transfer such technologies of transportation planning which will help to avoid or overcome urban transportation problems.

2. BRIEF ASSESSMENT OF PUBLIC TRANSPORT IN GABORONE

A case study of Gaborone Public Transport is not intended to be very detailed, but to provide a platform for further discussion, whether and to which extent an urban transport problem in Gaborone exists, and in what direction the appropriate policy response and technology transfer may lie.

2.1 The National Policy Framework

Paper on Proposal for a Road Transport and Traffic Policy on the Road Sub-sector as a contribution towards the drafting on a National Transport Policy has been prepared by the then Department of National Transport & Communication in 1996.

The Paper formulates the national basic policy objectives and strategies. The four broad national and sectoral policy-planning principles of Botswana Government guide the mission of road transport, namely:

- (i) *Rapid economic growth, which should be facilitated by and in turn encourage transport development;*
- (ii) *Sustainability of economic growth, which should be ensured through cost recovery as an integral part of the overall strategy. Government has to ensure that the road infrastructure and services provided are maintained. Environmental protection and resource conservation have, of necessity, to be promoted;*
- (iii) *Economic independence has to be achieved through the development of strong, efficient and competitive indigenous transportation industry in which Botswana have to participate actively.*
- (iv) *Social justice, as a transport policy planning principle, is to be met by making transport services accessible to all, including the disadvantaged citizens. The Existing Rural Bus Subsidy Scheme and the regulation of fares are measures aimed at achieving the objective of social justice.*

One of the key elements of the Government's development strategies is to achieve sustained economic growth by encouraging the private sector to increase and improve its investment and operations, respectively.

The policy proposal emphasises the need of promoting fair competition between providers, but the promotion of competition does not preclude the involvement of or intervention by the Government.

It suggests that Government should play active role in the regulation of competition and, in some cases, also in provision of services and facilities in the transport sector from the following reasons:

- (i) problems sometimes associated with low demand or small markets;
- (ii) the impact of road traffic on environment and safety;
- (iii) regulatory practices and systems imposed by multilateral or bilateral transport agreements;
- (iv) the need to ensure that competition does not inhibit but supports the overall objective to promote socio – economic development.

The overall function of the Department of National Transport and Communication in respect of road passenger transport is defined in the Paper as follows:

“To promote an efficient, effective, coordinated, affordable, safe, reliable and environmentally sensitive road passenger transport system in urban and rural areas to improve people’s mobility and access to opportunities and services.”

The strategic objectives of road passenger transport are to provide an appropriate and affordable standard of accessibility to workplaces, commercial and social services and many other locations of importance to the daily life.

This means:

- (i) to promote the use of public transport over private car travel
- (ii) to encourage more efficient urban and land use structures to reduce travel distances and times for commuting
- (iii) to promote, encourage and plan for the use of a wider range of appropriate transport, including vehicles, bicycles, three-wheelers and motor cycles, walking etc. in both urban and rural areas

2.2 Institutional Arrangements of Public Transport

Department of Road Transport and Safety

The Department of National Transport and Communication has been re-named as a Department of Road Transport and Safety (DRTS) in 1999. It acts as a regulatory body in the public transportation sector. The department issues permits for operating public transport vehicles as per Road Transport Act (Permits), Chapter 69:03, from 1973, amended in 10/2000. The Department of Road Transport and Safety grants or refuses an application based on consultation with Transport Advisory Board, which is nominated by

the Minister responsible for transport. An inspectorate has been established by the Department to look into matters of roadworthiness of vehicles, adherence to scheduled routes of public transport and other issues relating to transportation in general. The inspectorate works in cooperation with the police, but is heavily understaffed. The Department also licenses drivers and public sector vehicle drivers.

Currently, the DRTS in association with operators decide on the new minibus routes to be operated, however, operators may refuse the routes that they consider not to be profitable. This results in the routes not necessarily linked to the settlement patterns. Some routes are served by larger number of minibuses than necessary, at other routes a waiting time is close to an hour. (Mafavuneh, 1999).

Gaborone City Council

Gaborone City Council is responsible for providing the infrastructure such as bus terminals, bus bays and shelters. Working relationship between DRTS and City Council has been established and the DRTS is nowadays involved in transportation planning for the newly planned settlements.

Operators

Operators are the sole providers of the service after obtaining permit from DRTS. They cover their operation costs. Operators are not under any obligation to declare their income since they do not pay any income tax. The government saw the emergence of the minibus system in Botswana's urban centres as empowerment of the small entrepreneurs. It has been seen as a mechanism of reducing unemployment (Bolaane, 1998).

2.3 Modes of Public Transport

Public transportation in Gaborone is provided by licensed minibuses, shared taxis and cabs. There are currently 828 minibuses and 369 licensed taxis to operate within and around the city. Even though the numbers of permits are known, it is not easy to establish whether they are all really operating on a particular day. There is no law compelling them to render the service everyday except economic drive.

Minibuses operate according to a regulated routing system and they charge a uniform fare, which is fixed by the Government. A seating capacity is normally fifteen seated passengers. Current trend is to introduce 25- to 30- seater buses at the routes where the demand is high. It is expected that this measure will help to reduce the traffic congestion.

A shared taxi is a saloon car in which several passengers, not in the same party, are travelling together and pay separate fees. Taxis are queuing at the ranks, have blue registration number plate and can be stopped along the route.

A 'dial a cab' taxi system has been recently introduced and is operated by two private companies. Cabs do not queue at the ranks; the service can be requested by a phone call through the operator's office.

All drivers of public transport vehicles must have Public Service Vehicle licence. Permits are issued to each vehicle and they are valid for a maximum of one year. Conditions attached to permit include: submission of a copy of road worthiness certificate which is issued by Vehicle Testing Station for a period of 6 months, a copy of a vehicle registration book, applicant's personal identification document (OMANG) and a payment of permit fee.

Before the permit is issued, vehicles are checked if they comply with the Road Transport Permits Act, i.e. seating capacity, owner identification marks on the both front doors, route identification written in bold letters on the front panel, a fire extinguisher, vehicle general cleanliness and general body build (doors and windows working properly).

Inspectors carry out random checks on the validity of Permit and vehicle Certificate of Roadworthiness, overloading, adherence to designated route, completeness of a route. Offences are subject to fines that are progressive: first offence P200, further offences (up to max of three) P400. If there are more than three offences, a permit is not renewed.

The increase in number of minibuses had led to competition for the road space between private cars and public transport vehicles. Where congestion is severe, it leads to reckless driving and subsequent increase of road accidents. Public transport drivers are competing for passengers, stopping suddenly at the road edges and then forcing themselves back to the traffic flow.

Demand for services is mainly between 0630hrs and 0800 hrs in the morning and 1630 and 1830 hrs in the afternoon. Services are not easily available in the late evenings. The fixed tariff, which is not distance-based, creates a problem of lack of availability of services to remoter areas after hours. It also leads to oversupply of services in certain areas and undersupply in others.

Long – distance passenger operations occur mainly between main urban centres and major rural villages. Buses (and not minibuses) are used specifically for these operations.

2.4 Bus routes

There are currently 35 operational routes within Gaborone. Most of the routes begin and end within the CBD.

There are no signs, few shelters, no maps posted on the streets. You have to know where to stand for a minibus, or catch sight of one and flag it down. The unofficial roadside drop-offs have led to deterioration in the road network and roadside drainage system.

Drivers tend to make U- turns wherever they find enough passengers to fill their minibus. It leads to the situation that during peak period people from distant high- density residential areas do not get service and they have to queue for a long time. Drivers want to make maximum profit at a short period of time and to reduce mileage. This attributes to overloading and over speeding to beat competitors and stopping suddenly to pick extra passengers along the route, thus causing danger to the passengers and other road users.

2.5 Public Transport System Fixed Facilities

Earlier city infrastructure planning in Gaborone did not address the needs of pedestrians and public transport commuters, neither did it address the needs of cyclists. Passengers' long walks along roadways without sidewalks are still a reality. Bus lay – byes and fixed stops were not provided. This has led to the deterioration and wearing out of road shoulders since minibuses could be stopped anywhere along the route. Bus stops at present range from formal bus lay-byes to unofficial roadside drop-offs along the roads. Lack of shelter is still common. Shelters provided at the bus terminals and at some bus stops are made of metal sheets, which undoubtedly reflect a lot of heat in summer periods. However, a lot of improvement has been achieved recently. New shelters provided by City Council are placed along the main routes and are of the good standard.

The City Council has two minibus terminals where all minibuses circulate. The terminals are separated by a railway line over which is constructed a pedestrian overpass. This overpass is very unpopular amongst commuters since it hampers smooth interchange between routes. The western part of the terminal is shared with long distance buses (intercity buses). The terminals are also a popular place for informal traders. This increases the demand for already congested space and limited facilities and leads to the deterioration of terminal environment.

The existing infrastructure at the terminals is stretched beyond its capacity. Bus terminals cannot accommodate all available minibuses and they are overcrowded during the peak period. Minibuses have to queue at the entrance / exit roads as the access roads are narrow and heavily congested by other vehicular traffic.

3. TECHNOLOGY TRANSFER IN TRANSPORTATION PLANNING PROCEDURE

3.1 Urban Transport Problem

After having discussed the public transport in Gaborone, the question “What is the urban transport problem?” could now be answered. For ordinary people going about their every day lives, that is the urban transport problem.

The significance of urban transport difficulties stems from the fact that half of the world's population lives in urban areas; the rate of urbanisation is fastest in the developing world where the financial resources to overcome such problems are scarce. (Marshall, 2000).

It is clear that the urban transport problem is universal; the underlying economic causes are the same. All new transport infrastructure generates new traffic; new roads generate faster trips, longer trips, more trips by car and higher car ownership, all of which add up to more traffic. The problems are getting worse as urban populations grow. It is clear that doing nothing is not a solution, because left to itself; the urban transport problem inevitably worsens.

Rapid population and economic growth, with accompanying shortages or under-investment in physical transport capacity and infrastructure, generally have characterized developing countries. Urbanization and agglomeration pressures often exacerbate these shortages. The result is a transport system that faces congestions and environmental externalities in some parts, while other parts remain under-utilized or underdeveloped.

For developing countries, the principal need is to expand the capacity of the transport network. This capacity enhancement is required to relieve congestion and 'keep up' with economic and trade growth. This is often difficult because much of the transport network typically was developed by the state or was inherited from colonial days.

Transport reforms in developing countries thus have a major objective of expanding services, networks, and capacity. These reforms are most consistently occurring when the policy orientation is to expand the sector, rather than to endow existing state transport enterprises with new resources for such growth. Efforts to improve the performance or strengthen the position of the state enterprises have produced only meagre results. By contrast, deregulation of entry and active attempts to bring new competitors and new capital have served to privatise the industry around the state enterprise.

Overall, each type of transport environment brings with it particular opportunities or needs for improved transport, but also must deal with historical legacies that will shape how underlying changes in transport technologies and economics play out in practice.

Thus, a greater transfer of experiences and planning technologies is needed in order to achieve the sustainable mobility and reduce the urban transport problem.

3.2 Relationship between Transportation and Land Use Planning

Good transport facilities are the result of sound planning. Transportation planning, however, cannot be, and must not be, isolated from land use planning and transport technology. Transport and land use are fundamentally bound together. Transport itself constitutes a significant land use, as well as providing the framework for accessibility for all other land uses. Land use – transport relationships may be considered and analysed from a number of standpoints (see, for example Marshall, 2000). This paragraph concentrates on the potential contribution of land use policies towards the objectives of sustainable mobility.

Land use is an important influence on transport provision, as the use and distribution of buildings (and hence the location of activities) affects the pattern and overall amount of travel by different modes of transport. This is manifested through trip generation rates for different land use activities, the resultant patterns of movement between origins and destinations and the relative accessibility of these, and hence the relative convenience of using different modes. The nature of built form may also influence the attractiveness of non-motorized modes, as the layout and form of buildings can also provide orientation, interest, security and shelter for pedestrians and cyclists.

Although the function of transport system is to serve the land use, the viability of a development is a function of the transport system. On the one hand, transport encourages land use development; on the other land use creates the need for transport development. If transport system is overloaded, it distracts from the attractiveness of any land development in the area. This interaction of land use and transport must be fully understood if the relationship between the two is to be successful.

Traditionally, transport problems have been tackled by looking for transport solutions - for example, the problem of congested roads might be solved by increasing capacity through building more roads, or improving the capacity of existing road network. However, it is also possible for land use solutions to have a role in assisting with transport objectives, particularly those concerning sustainable mobility. Sustainable transport systems can be described as those that can function for the foreseeable future without collapse or depletion of the resource base upon which they depend. Sustainable transportation systems are much more complex and holistic than the mechanistic and simplistic models which seek to maximize circulatory capacity, travel speed and mobility.

In other words, land use solutions may be applied where there is a need to modify demand for transport, in contrast to supply side solutions reliant on the provision of transport infrastructure, traffic control systems and so on.

Land use solutions tend to involve the layout of built form and the distribution of activities therein, including the density and mix of uses. These factors can influence travel pattern as traditionally expressed through trip generation, distribution and modal split. In particular, they may be used in order to discourage car use by individuals, and promote environmentally friendly alternatives. A variety of land use solutions are available to assist towards achieving sustainable mobility, both through promotion of favoured behaviour and restriction of less favoured behaviour.

Bearing in mind the particular characteristics of land use solutions, it should be possible to investigate the means by which these can be used to reduce travel and promote sustainable mobility.

3.3 Examples of land use policies towards sustainable mobility

A variety of land use policies can be identified, which may assist towards the objectives of sustainable mobility, for example:

1. location of land use by transportation accessibility
2. mixed use development
3. urban structure and street pattern
4. public transport-oriented development
5. urban concentration
6. design for 'sensitive modes'
7. design of interfaces and interchanges
8. car-free zones and development

This is only one possible listing of categories; the policies are often complementary and bundled together in a variety of ways, such that there cannot be any single, definitive classification (Marshall, 2000).

Location of land use by transport accessibility

Land uses can be allocated according to the accessibility profile of its location. Uses not deemed complementary to public transport are located more remotely from transit stops.

Mixed use development

Mixed use development involves zoning to allow homes, shops and workplaces to be located in close proximity. This can allow people to live closer to their work, but more generally can encourage linking trips whereby several journey purposes can be satisfied in a single locality, thereby reducing overall travel. It should be noted, of course, that activities are liable to change over time. Therefore, an area designed to allow people to live close to their workplace would not necessarily result in all residents continuing to live locally, nor prevent conversion of businesses to homes (or vice versa) in the long term.

Urban structure and street pattern

The design of overall urban structure may be used to influence overall travel patterns and promote the use of environmentally favourable modes. This is applicable at different scales: for example, the urban structure of a settlement as a whole, or the street pattern at more detailed level of design.

Public transport-oriented development

The orientation of development and indeed whole settlement towards public transport is a recurring theme in planning, which has received regained impetus in the contemporary drive towards sustainability. However, while public transport orientation may enable and assist individuals to use public transport, there is no guarantee that provision will necessary result in travel reduction, especially if accompanied by high car ownership and in regions where only a small proportion of potential destinations are actually served by public transport.

Urban concentration

Urban concentration can reduce travel by making origins and destinations closer to each other, and also maximize the potential for trip linking. Urban concentration is associated with ideas of increased density and ‘compact’ settlements, and is embodied in plans for neo-traditional settlements and urban villages. In the case of urban villages, compact mixed use communities are created or ‘sustainable urban neighbourhoods’ are formed. A particular attention is paid to the details of how the aspirations of sustainability would be attained on the ground through the detailed design of transport provision and through attention to the public’s behavioural intentions and responses.

The creation of dense urban areas can be applied to the design of new development or can be applied retrospectively to existing urban areas. Thus, retrofitting existing urban form by introducing new dwellings could create the desired characteristics of ‘sustainable

urban form’ and land uses to increase population and employment densities and hence achieve ‘urban concentration’. This new building would necessarily involve land- take.

Design for ‘sensitive modes’

The environmental design of localities can encourage the more vulnerable or ‘sensitive’ modes of walking and cycling. Built form can provide a degree of shelter (from rain or sun), both laterally and overhead, which can protect to some extent the walker or cyclist, and hence encourage use of these modes in adverse climates.

Design of interfaces and interchanges

The key to this type of solution is to recognize that there is a congruence of transport interchange areas and interface areas of public space. Basically, this hinges on the importance of the pedestrian as the link between other modes – particularly between pedestrians and public transport- and between transport modes and other urban activities. Thus, the interchange is not seen simply in its functional role of changing transport vehicle or mode, but in its wider urban context.

As transport interchanges (for example, railway and bus stations) become upgraded- particularly through the introduction of ‘quality’ retail outlets- it is possible to speculate that the cost of waiting time is minimized. The contrast with the isolated bus stop is obvious: where there is no shelter, no nearby facilities and no confidence in estimating the waiting time, then the waiting time penalty may expected to be higher.

The message here is that by good environmental design of access to public transport in general – for example through the laying out of street forms where there is a combination of shelter, something to do, and adequate information about the time available to do it- the attractiveness of using public transport could be boosted.

Car-free zones and development

Regulatory policies may be used directly to remove cars or prevent their use in particular localities, for example residential developments or central zones of cities, or at particular times. Restrictions on cars are common in many cities, and these are often associated with policies for conversion of existing traffic streets to pedestrian streets in central areas.

In conclusion, this paragraph has explored a number of possibilities in the field of land use planning with the aim to influence travel patterns towards sustainable mobility or an overall reduction in travel. A range of land use policies was discussed which might be used to activate the travel reduction mechanisms of mode switching, destination switching and substitution by linking trips. Whichever planning solutions are proposed, it is never going to be an easy task to make substantial reductions in travel. This reflects the fact that journeys are now made for new purposes and between newly developed places, which did not previously exist.

3.4 Travel Pattern

The travel patterns for people in households below the poverty level are significantly different than the patterns for people in households above the poverty level. Currently, public transit, which is available mostly in the urban areas, is only a marginal solution to the transportation problems of working poor. Clearly, many low-income people are limited by their transportation options. Low-income people in growing cities need to travel by public transport without having the financial means to pay for its cost. The conventional systems of bus operations usually have a very poor financial performance due to high cost and declining real fares. Bus fares are kept low as a deliberate government decision to benefit the lower – income groups. The result is that instead of being able to invest – to cope with the rapidly increasing demand- these corporations lose money and their service deteriorates.

Transport infrastructure commonly has been publicly provided. In the provision of transport services, governments have controlled entry, products, prices, profits, and investments, either through regulation or through state-owned enterprises. This has had the following important consequences: (Oster et. al., 2000).

1. Assets have not been maintained and investment has been sub-optimal. Attempts to serve the poor by keeping fares low have led to physical deterioration of vehicles and to subsequent reduction in services provided by many urban bus companies. This tendency to under-price transport services created revenues shortfalls leading to under-investment. Public roads have deteriorated, especially in Africa
2. Costs to maintain a financially viable system have been too high.
3. Service failed to respond to needs or changes in market demands. Many public transit systems have been slow to develop services for the poor on urban periphery, while at the same time making it hard for new services or informal transit activities to develop.

As governments incurred mounting losses from state-owned transport enterprises, they faced growing financial needs in other areas and saw privatisation as a means to raise revenues. They also began to fear that their economic growth might be hampered by a failure of state-owned transport to respond to the changing needs of industry and growing international trade. Governments began to reconsider their role and to open up transport services and infrastructure to greater participation by private sector.

3.5 Transport and Environment

Globally, the concern over road transport is in respect of its contribution to the environmental problems. It is mainly in respect of its contribution to the enhanced greenhouse effect in the form of carbon dioxide emissions.

Most other environmental problems, however, are much more localised in their effects, such as urban air quality and noise pollution. General public is no longer prepared to tolerate the environmental degradation associated with road transport. There have been attempts to prevent the construction of new roads; there have been calls to close roads in

the cities, either as a response to poor air quality, or because of the effects of the roads on the communities through which they pass (Maddison et. al, 1996).

It is now apparent that concern about the environmental impact of road transport and road infrastructure cuts across social classes. This is particularly so in case of ozone, which is blamed by many for the prevalence of asthmatic attacks, particularly among children.

Thus, far from promoting personal freedom, private transport may have had the opposite effect, requiring the restriction of personal movement.

3.6 New Approach to Transportation Planning Process

The current approach to transportation planning process can be demonstrated on an example of the Dublin Transportation Office' (DTO) document " A platform for Change".

The starting point for the development of a transportation strategy is to ask the question: "what type of a city do people wish to live, work and play in?" An attempt to answer this question may be found in a Statement, which, in broad terms, describes the Vision.

Vision statement might be formulated for example as:

- A city which embraces the principles of sustainability
- A leading African city, proud of its heritage and looking to the future
- The National Capital, seat of government and national centres of excellence
- A living City and Region, on human scale, accessible to all and providing a good quality of life for its citizens

The next step is to translate that Vision into series of more concrete, though still broad, *objectives*, for example such as:

The Regional Economy

- Improve accessibility and reduce congestions;
- Sustain economic development and regeneration
- Consolidate existing economic activity
- Encourage an increase in participation in the labour force, particularly by disadvantaged groups in society;
- Enhance goods distribution in a sustainable way

Quality of life

- Reduce growth in the demand for transport, especially private transport
- Reduce the need for car commuting by improving the reliability, availability and quality of public transport
- Provide adequate capacity for all journeys to work and education
- Reduce travel time and congestions
- Ameliorate direct environmental effects of transport – noise, severance, air pollution and greenhouse gas emissions;
- Promote cycling and walking as safe, sustainable and healthy means of transport

- Improve transport safety

International and National Context

- Act consistently with SADDG and Government plans and policies
- Foster sustainable development
- Improve accessibility to ports and airports for passengers and goods

Development of the City and Region

- Promote the Government planning strategies
- Within the rural areas, promote the self-sufficiency of the development centres

Efficiency in Implementation

- Optimise the use of existing infrastructure and facilities
- Promote sustainable land use
- Ensure timely implementation to meet sustainable transport needs
- Ensure the efficient and cost effective use of resources- public and private sector
- Ensure that legislative, institutional and administrative structures optimise implementation
- Ensure minimum disruption during construction and implementation

Deciding how to respond effectively to the transportation challenge requires a great deal of detailed technical, transportation modelling and evaluation work. Because of a general lack of experience in planning and design, most developing countries urban transport institutions rely heavily on the use of expatriate consultants. Such contracts should provide also a scope for skill and technology transfer.

Any strategy, that relies on the provision of additional infrastructure and improved services alone will not succeed. It follows that some form of *demand management* is necessary. Examples of demand management include increasing the cost of long-stay parking, car sharing or road pricing. The primary objective in *traffic management* is to optimise the use of road space for all users. This means developing effective networks for pedestrians, cyclists and public transport users.

The phasing of the Strategy is designed to address *short-term* transportation needs and to put in place an integrated transportation system, which will meet *the medium to long-term* requirements of the City.

In short term, the aim is to provide additional road network capacity, additional public transport capacity, primarily on the bus network, and to improve traffic management, including better bus priority. In the medium to long term, the emphasis might switch to rail-based public transport with the aim to create an integrated transport network, which has sufficient capacity to meet the transportation requirement well beyond the 2016 horizon.

A Strategy provides an overall planning framework for the development of the transport system. Each project will then have to be taken through a detailed planning process,

involving, as appropriate, route selection, technical feasibility studies, economic and environmental evaluations, detailed design, public consultation and statutory approval procedures.

The decision problem is then seen as one of choosing options from a complete set of alternatives and scenarios, with estimates on their probability of occurrence; the utility of each alternative is qualified in terms of benefits and costs and other criteria like environmental protection, safety, etc.

4. CONCLUSIONS AND RECOMMENDATIONS

- 4.1** The strong institutional structures with a view to provide coordinated and comprehensive country – wide transport programmes has to be established.
- 4.2** The process of transport planning must be integrated with urban development.
- 4.3** Optimal land use and transport planning strategy should be adopted to reduce the number and length of motorized trips.
- 4.4** The provision of public transportation should be joint venture between the public and private sector. Due to the strained budget there is a need for private sector to be involved in financing of public transportation. The possibility of concessions should be exploited.
- 4.5** Planning and allocation of public transport routes should be based on analysis of commuters' demand and use of proper planning techniques.
- 4.6** Properly designed bus stops with shelters should be provided along bus routes.
- 4.7** Information on public transport routes, hours of operation and intervals should be displayed at the bus stops.
- 4.8** Public transport routes should be marked into street maps for better orientation of general public.
- 4.9** Selection of bus types should be based on traffic demand from the point of view of economy of operation as well as reduction of road congestion.
- 4.10** Possibility of introduction of bus priority system should be assessed. If established, it will lead to considerable decrease of travel time of public transport users, enhancing thus the attractiveness of public transport and improving the quality of environment.
- 4.11** Provision for pedestrians as well as cyclists has to be made as they represent the majority of trip makers.
- 4.12** System of staggered business hours should be introduced so that those working in the formal employment sector will not commute to work during the narrow morning peak period.
- 4.13** Both owners as well as public transport operators should be trained on managerial skills as well as on public relations.
- 4.14** Rural passenger transport requires a serious consideration in the national context. Assessment of possibilities of rural public transport subsidy schemes for the purpose of social justice should be undertaken.
- 4.15** Urban transport institutions should aim at skill and technology transfer in the field of transportation planning and design.

- 4.16 Timely implementation of adopted plans and strategies should be ensured.
- 4.17 In long term, the emphasis might switch to rail-based public transport with the aim to create an integrated transport network, which has sufficient capacity to meet the transportation requirement well beyond the 2016 horizon.

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